

VV Versus Bin Correlation Project  
Cover page - Name this topic Something  
that TFD-8 report (Random track changes  
based on rec. on ts)  
capture # pre-revisit)

## 2.1 Scribe Queries

At the request of the DEQ, Tetra Tech conducted an initial query in March 2008 to determine whether bin designations correspond with expected VV observations. Subsequently, several sets of additional queries were developed by Tetra Tech and EPA to further verify data integrity. Two Tetra Tech programmers independently developed the same set of queries while EPA developed a third set. Database query findings are described in Section 3.1.

## 2.2 Manual Verification of Randomly-Selected Samples

In April 2008, Tetra Tech conducted manual verification of randomly-selected soil samples. Ten randomly-selected soil samples from each bin (A, B1, and B2) underwent the verification process described below. In addition, all five Bin C samples were verified. For each sample, Tetra Tech compiled and verified the following information from Scribe and the field log books and populated the table that follows Section 4.0.

Scribe - So are these specific cell entries?

- Sample number
- Location number
- Parcel number
- Sample date
- LA Bin (A; B1; B2; C)
- LA detected (yes; no)
- LA result qualifier (not detected [ND]; trace [Tr]; less than [<]; no qualifier)
- VV observations
- Sampler(s) initials

Field log book -

- Sample number
- Location number
- Parcel number
- Sample date
- VV observations
- Sampler(s) initials

## 1.0 OBJECTIVE

Tetra Tech evaluated the Troy Asbestos Property Evaluation (TAPE) 2007 field season data to determine whether laboratory results for Libby Amphibole (LA) in soil samples correspond as expected to visible vermiculite (VV) observations recorded in the field log books and in the TAPE Scribe database (Scribe). The Scribe database was electronically populated from the GeoXT handheld personal digital assistants (PDAs) used in the field. An additional objective was to identify source(s) of any procedural errors.

The expected outcome should show samples with detectable LA (based on laboratory analysis) as having VV (based on recorded field observations); however, a comparison of the analytical data to the VV observations recorded in Scribe revealed that VV was predominantly not observed by the field team when the samples with detectable LA were collected. The Montana Department of Environmental Quality (DEQ) asked Tetra Tech to perform verification of selected field data to identify the source of the unexpected outcome.

## 2.0 PROCEDURE

TAPE analytical data follows the Libby operable unit protocols in that soil samples are assigned to one of four bins on the basis of laboratory results for LA. Bin A includes samples in which no LA was detected. Bin B1 includes samples with detectable but less than 0.2 percent LA by weight. Bin B2 includes samples found to contain 0.2 percent but less than 1 percent LA by weight. Bin C includes samples with 1 percent or greater LA by weight.

To determine whether samples with detectable LA (based on laboratory analysis) were observed and recorded as having VV (based on field observations), Tetra Tech conducted a series of Scribe database queries as well as manual verification of several randomly-selected samples from each bin.

The database query process is summarized in Section 2.1 and the manual sample-verification process is summarized in Section 2.2.

3 potential steps in process that may account for non-correlation to confirm it is a real result or find anomalies in system. so non-correlation isn't real

or verified?  
did we double check  
the 200's, etc?

Tetra Tech compared the bin designation for each sample to the VV observations in the log books and to the corresponding VV entries in Scribe.

Additionally, to verify that the data recorded in the GeoXT handheld PDAs were downloaded correctly to Scribe, Tetra Tech compared VV observations in the log book to the corresponding VV entries in Scribe. Also, as part of the verification procedure, TAPE GeoXT protocols developed in the summer of 2007 were reviewed to identify whether errors in VV observation accuracy could have occurred. In July 2007, the field team found that the GeoXT PDAs would unknowingly swap use areas; once discovered, the sample database coordinator had to manually reenter a large number of field entries. As part of the verification procedure summarized in this memorandum, Tetra Tech attempted to review the original GeoXT screens to identify potential VV errors; however, the original screens had been replaced as the sample database coordinator fixed the errors, therefore, the earlier screens were impossible to trace.

VV observation  
is field  
team - not  
computer

### 3.0 FINDINGS

Results of the database queries are summarized in Section 3.1. Results of the manual sample verification process are summarized in Section 3.2.

#### 3.1 Scribe Queries

The database query comparing bin designations to VV observations indicated that the majority of samples with laboratory detectable LA were not observed and recorded as having VV from field observations.

Subsequent queries developed by Tetra Tech and EPA to check data integrity and verify the initial query results, however, did not reveal any significant integrity issues with the data set. A few minor discrepancies were discovered, but none significantly altered the result counts.

#### 3.2 Manual Verification of Randomly-Selected Samples

Findings from the comparison of bin designation versus log book VV observations are summarized in Section 3.2.1 and on Table 1. Findings from the comparison of bin designation

verses VV entries in Scribe are summarized in Section 3.2.2. Findings from the comparison of VV entries in Scribe versus log book observations are described in Section 3.2.3.

##### 3.2.1 Bin Designation Verses Log Book

**Bin A.** For the 10 randomly-selected Bin A samples (no LA detected), log book entries for 7 indicate no VV. Log book entries for 2 samples state vermiculite was observed (one entry indicates vermiculite was observed and the other specifies low VV in 5 aliquots and no VV in 25 aliquots). The log book entry for the remaining Bin A sample does not specify whether VV was observed (see table for details).

**Bin B1.** For the 10 randomly-selected Bin B1 samples (less than 0.2 percent LA), log book entries for all 10 state no VV was observed (see table for details).

**Bin B2.** For the 10 randomly-selected Bin B2 samples (0.2 percent but less than 1 percent LA), log book entries for 8 samples indicate no VV was observed. The log book entry for 1 sample specifies intermediate VV in 2 aliquots and no VV in the remaining 28 aliquots. The log book entry for the remaining sample does not specify whether VV was observed (see table for details).

**Bin C.** For the 5 Bin C samples (greater than or equal to 1 percent LA), log book entries for 4 indicate no VV was observed. The log book entry for 1 sample indicates high VV in all 30 aliquots (see table for details).

##### 3.2.2 Bin Designation Verses Scribe

**Bin A.** For 8 of the 10 randomly-selected Bin A samples (no LA detected), Scribe entries for VV\_Low, VV\_Intermediate, and VV\_High are 0 (indicating no VV was observed). For 1 Bin A sample, the Scribe entry for VV\_Low is 5, and for VV\_Intermediate and VV\_High are 0. For the remaining Bin A sample, Scribe entries for VV\_Low and VV\_High are 4, and for VV\_Intermediate is 0 (see table for details).

**Bin B1.** For the 10 randomly-selected Bin B1 samples (detectable but less than 0.2 percent LA), Scribe entries for VV\_Low, VV\_Intermediate, and VV\_High are 0 (see table for details).

**Bin B2.** For the 10 randomly-selected Bin B2 samples (0.2 percent but less than 1 percent LA), Scribe entries for VV\_Low, VV\_Intermediate, and VV\_High for 9 are 0. Scribe entries for the remaining sample are 2 for VV\_Intermediate and 0 for VV\_Low and VV\_High (see table for details).

**Bin C.** For 4 of the 5 Bin C samples (greater than or equal to 1 percent LA), Scribe entries for VV\_Low, VV\_Intermediate, and VV\_High are 0. For the remaining Bin C sample, Scribe entries for VV\_Low, VV\_Intermediate, and VV\_High are 0, 0, and 30 respectively (see table for details).

### 3.2.3 Scribe Verses Log Book

The comparison of the VV entries in Scribe to the VV observations in the log books revealed no significant discrepancies. There are two samples (TT-00703 and TT-00568) for which all VV entries in Scribe are 0 while the logbook does not mention VV (see table for details).

## 4.0 Conclusion

Based on this verification process, it appears that the majority of the samples with laboratory detectable LA did not have recorded VV observations. This outcome is attributed to unobserved and unrecorded field observations of VV and not the result of Scribe data loading or query errors.

the discrepancy of correlation between VV and bins is not due to data entry or queries, etc. Separate reports will be prepared for Visual in field. It is not resp. for lab check.

TABLE 1: SUMMARY OF COMPARISON OF VISIBLE VERMICULITE AND LABORATORY ANALYTICAL RESULTS FOR SOILS IN RANDOMLY-SELECTED TAPE PROPERTIES

Bin	Sample ID	Location ID	Parcel ID	Sample Date	Detected? / Result Qualifier	VV - Low	VV - Intermediate	VV - High	VV Observations in Log Book	Sampler(s) Initials
A	TT-01787	UA-200638	AD-200491	6/28/2008	No / ND	0	0	0	No VV	MAS
A	TT-00864	UA-200545	AD-200503	6/11/2008	No / ND	0	0	0	No VV	CM / NWS
A	TT-04031	UA-201418	AD-200511	8/28/2007	No / ND	0	0	0	No VV	JHR / DRS
A	TT-00703	UA-200191	AD-200515	6/11/2007	No / ND	0	0	0	Not specified	JS / RR
A	TT-01301	UA-200720	AD-200730	6/18/2007	No / ND	0	0	0	No VV	KEK / MJD
A	TT-03465	UA-201678	AD-201119	8/22/2007	No / ND	0	0	0	No VV	JHR / NTS
A	TT-03737	UA-202127	AD-201125	8/23/2007	No / ND	5	0	0	Yes 5 Low / No 25	DRS / JHR
A	TT-04263	UA-201956	AD-201178	9/24/2007	No / ND	0	0	0	No VV	BRE / JJJ
A	TT-03854	UA-201763	AD-201183	8/22/2007	No / ND	0	0	0	No VV	BRE / JL
A	TT-00588	UA-200258	AD-201185	5/24/2007	No / ND	4	0	4	Vermiculite observed*	MEB / SLW
B1	TT-00507	UA-200136	AD-200253	5/24/2007	Yes / Tr	0	0	0	No VV	KS / MU
B1	TT-02394	UA-201182	AD-200349	7/19/2007	Yes / Tr	0	0	0	No VV	JPA / MU
B1	TT-03598	UA-201869	AD-200378	9/17/2007	Yes / Tr	0	0	0	No VV	BRE / JJJ
B1	TT-03585	UA-201862	AD-200394	9/14/2007	Yes / Tr	0	0	0	No VV	JPA / MAS
B1	TT-00746	UA-200155	AD-200405	6/11/2007	Yes / Tr	0	0	0	No VV	NTS
B1	TT-01389	UA-200784	AD-200407	6/18/2007	Yes / Tr	0	0	0	No VV	MU / NS
B1	TT-00183	UA-200038	AD-200610	5/10/2007	Yes / Tr	0	0	0	No VV	JHR / SE
B1	TT-04035	UA-201518	AD-200658	8/29/2007	Yes / Tr	0	0	0	No VV	BRE / JJJ
B1	TT-04254	UA-201950	AD-200727	9/24/2007	Yes / Tr	0	0	0	No VV	BRE / JJJ
B1	TT-02854	UA-201331	AD-201495	7/24/2007	Yes / Tr	0	0	0	No VV	JC / JPA
B2	TT-02404	UA-201203	AD-200344	7/17/2007	Y / <	0	0	0	No VV	BRE / CM
B2	TT-03040	UA-201682	AD-200652	8/7/2007	Y / <	0	2	0	Yes 2 Intern / No 28	CRR / SSS
B2	TT-02986	UA-201423	AD-200665	8/6/2007	Y / <	0	0	0	No VV	DRS / MD
B2	TT-03604	UA-201875	AD-201021	9/17/2007	Y / <	0	0	0	No VV	BRE / JJJ
B2	TT-02237	UA-201106	AD-201080	7/13/2007	Y / <	0	0	0	No VV	BRE / CM
B2	TT-02998	UA-201430	AD-201098	8/6/2007	Y / <	0	0	0	No VV	DRS / MU

TABLE 1: SUMMARY OF COMPARISON OF VISIBLE VERMICULITE AND LABORATORY ANALYTICAL RESULTS FOR SOILS IN RANDOMLY-SELECTED TAPE PROPERTIES (Cont.)

Bin	Sample ID	Location ID	Parcel ID	Sample Date	Detected? / Result Qualifier	VV - Low	VV - Intermediate	VV - High	VV Observations in Log Book	Sampler(s) Initials
B2	TT-00568	UA-200266	AD-201104	5/25/2007	Y / <	0	0	0	Not specified	MJD / SSS
B2	TT-03642	UA-201752	AD-201106	8/22/2007	Y / <	0	0	0	No VV	BRE / JL
B2	TT-01346	UA-200691	AD-201145	6/14/2007	Y / <	0	0	0	No VV	KEK / MJD
B2	TT-04135	UA-201826	AD-201191	9/11/2007	Y / <	0	0	0	No VV	BRE / JPA
C	TT-03488	UA-202031	AD-200009	8/23/2007	Y / None	0	0	0	No VV	JL
C	TT-00449	UA-200051	AD-200237	5/16/2007	Y / None	0	0	0	No VV <sup>b</sup>	MJD / NWS
C	TT-01384	UA-200770	AD-200480	6/15/2007	Y / None	0	0	30	Yes 30 High	MU / NS
C	TT-04306	UA-201976	AD-201039	9/26/2007	Y / None	0	0	0	No VV	BRE / JLJ
C	TT-03471	UA-202024	AD-201123	8/22/2007	Y / None	0	0	0	No VV	JHR / JLJ

Notes:

- a Log book states "vermiculite highly observed in the southern portion of the driveway," but doesn't quantify or qualify what was seen.  
b Resident informed sampling crew that her husband used to drive truck for W.R. Grace. Area sampled is reportedly a former garden. ~ *what do we care?*

VV was observed by samplers but LA was not detected in the sample (Bin A designation).  
LA was detected in the sample (Bin B1, B2, or C designation) but VV was not observed by samplers.

*drop colors*

*So if you print this now then look entry back in - here is your DSE table*

*TFD-8*

*Fire in time 1601 data*

AD	LA	SWA	Bin	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030

*for these Bin Newly collected*

*anything else that may change?  
I see a separate DSE for TFD-8 activities -*

*So these 7 pages are VV and DSE in one  
TFD-8 is VV  
need DSE next full for the "field"*

*talk to plant for his reporting*

*TFD-8 -> add back in interior only  
for revisit this Summer*